2014

Career and Technical Education

Return on Investment Study – White Paper

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Executive Summary

In partnership with CECI staff, EDSI conducted an extensive analysis of the state's investment in Career and Technical Education (CTE) between 2008 and 2013. Data compiled from more than 298 Career and Technical Education Programs and 609,000 students was analyzed to identify investment and outcomes – primarily graduation rates and wages.

The study showed that students classified as "concentrators", students taking 4 to 6 credits in the same course of study or career pathway sequence, have better outcomes when compared to all other CTE students and non-CTE students.

Graduation Rates and Wages

Chart 1 below shows that the graduation rate of students enrolled in CTE programs is higher than students not enrolled in CTE programs.

Chart 1

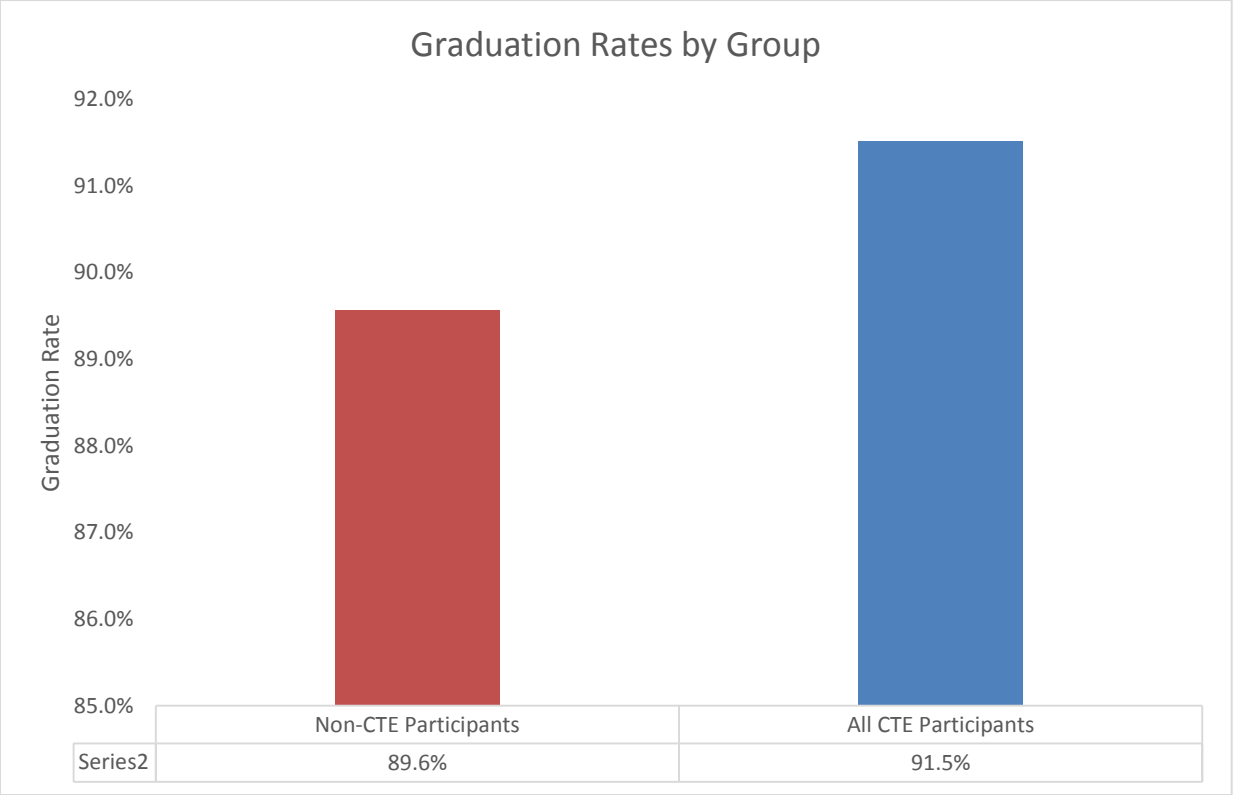


Chart 2 below shows that the graduation rate for CTE concentrators is higher than CTE students that did not concentrate.

Chart 2

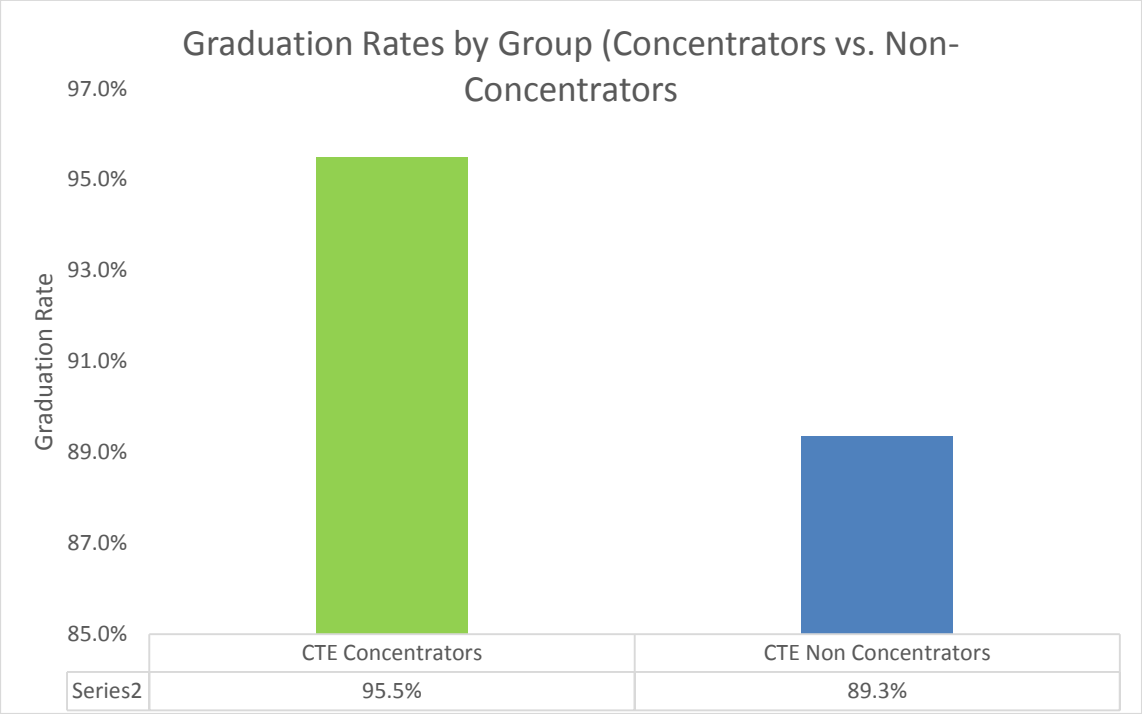


Chart 3 below shows that wages of students enrolled in CTE programs is higher than students not enrolled in CTE programs.

Chart 3

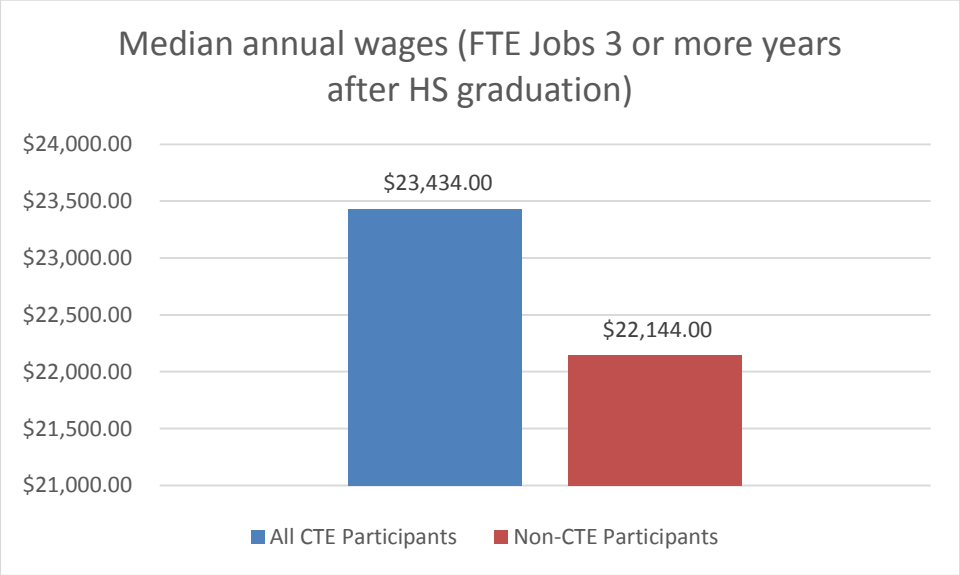
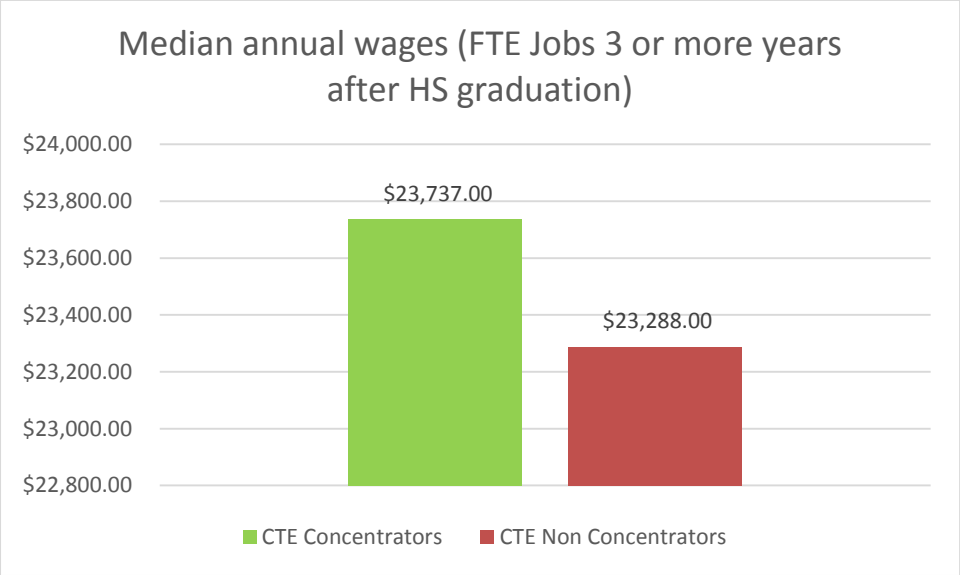


Chart 4 below shows that the wages for CTE concentrators compared to CTE students that did not concentrate three years after graduation.

Chart 4



The graduation rates and wages for students from CTE programs was consistently better than students that had not participated in or completed CTE programs. Graduation rates and wages increased even more when students were concentrators.

High Value CTE Courses and Career Pathway

The study also showed that some CTE courses lead to higher wages, and that concentrators, or career pathway sequencing of courses, led to even higher wages. The wage premiums listed in the charts below are the difference between wages listed in North American Industry Classification System (NAICS), and wages earned by CTE graduates in Indiana in those industries. Chart 5 below shows the wage premium earned for select CTE courses.

Chart 5

Reported Full Time Wages for Students completing these courses:	**Wage Premium of course wages over "All CTE Participant" wages**	**Wage Premium of NAICs connected wages over "All CTE Participants" wages**
Diesel Technology	$ 2,352.98	$ 3,674.48
Precision Machining	$ 2,316.98	$ 4,693.98
Welding Technology	$ 2,107.48	$ 4,504.98
Preparing for College and Careers	$ 1,061.98	n/a
Automotive Services Technology I	$ 1,059.48	$ 2,507.48
Advanced Manufacturing / Mechanical Engineering	$ 732.48	$ 3,889.98
Introduction to Agriculture, Food and Natural Resources	$ 648.48	$ 2,913.98

Students in selected courses of study completing a concentration, or a career pathway, are also earning a wage premium when compared to students taking individual CTE courses indicating that some course concentrations have a higher return-on-investment.

Chart 6 below shows the wage premium earned for select CTE course concentrations.

Chart 6

Selected Pathway Analysis	Annual Wage Premium for Completing Pathway vs Starting it	Annual Wage Premium for each Pathway completion over average CTE Concentrator
Agribusiness	$ 2,160.50	$ 3,123.90
Electrical Construction Pathway	$ 663.00	$ 3,376.90
Radio/TV Pathway	$ 907.00	$ 521.90
Entrepreneurship Pathway	$ (4.00)	$ 298.90
Early Childhood Education Pathway	$ (295.00)	$ (1,686.10)
Nursing Pathway	$ 832.00	$ (1,518.10)
Culinary Arts Pathway	$ (244.00)	$ (1,477.10)
Computer Networking Pathway	$ 109.00	$ 1,272.90
Welding Pathway	$ 1,930.50	$ 4,352.90
EMT / Paramedic Pathway	$ 2,462.00	$ 111.90
Automotive Technology Pathway	$ 1,756.50	$ 3,130.90

The goal of this study is to provide policy makers with information to assist with program design and determine the optimal use of taxpayer funds – not to identify winners and losers. The data clearly indicates that CTE programs improve graduation rates and lead to better wages; and that graduation rates and wages improve even more for students that focus their studies in a career pathway.

There are well over 125 different CTE courses offered across Indiana. When the data is analyzed from the course perspective, graduates from some courses and pathways of study are able to earn a higher wage premium than others. In most cases the wage premium exists because of the technical nature of the occupation, the demand for workers, or both.

Currently the demand for courses offered by CTE programs is driven by what courses students are interested in taking, not by job opportunities or the needs of business. The current CTE funding model is focused entirely on inputs – number of students enrolled. Shifting from paying for inputs to paying for

outcomes will benefit both students that participate in CTE, and businesses looking for skilled workers. This shift will also help put the state on a path to align learning opportunities with industry needs, which is key component of the Indiana Career Council's Strategic Plan, *Align, Engage, Advance: Transforming Indiana's Workforce.*

Project Overview and Methodology

In partnership with CECI staff, EDSI developed a formula to calculate the return on investment for both existing and future Career and Technical Education programs in Indiana and applied the formula to Indiana's existing secondary CTE education programs. The primary focus was secondary data because that was where both the bulk of the available data was and where most of the CTE funding is allocated. With the current data sets there are difficulties in determining student's training and experience prior to post-secondary CTE, which makes it more difficult to isolate the ROI.

The study focused on quantifying the returns on investment for secondary students taking Career and Technical Education (CTE) courses. Students were separated into cohorts based on the academic year in which they were in 12th grade. The analysis identified all CTE courses taken by those students from eighth though twelfth and calculates the funding that was associated with those courses. For example the 2009-2010 cohort looks at all CTE participation by students who were in 12th grade in 2009-10, eleventh grade in 2008-09, tenth grade in 2007-08, ninth grade in 2006-07, and eighth grade in 2005-06. There are a total of six cohorts examined, coinciding with graduation years of 2008, 2009, 2010, 2011, 2012, and 2013.

The analysis also identified which of the students were "concentrators" in CTE to determine if the returns were different for this group. Both the concentrators and non-concentrators are compared to the total statewide population and the secondary students who did not participate in CTE.

The main comparison of return available across all cohorts is the comparison of graduation rates among concentrators, CTE non-concentrators, and non CTE participants. A significant difference in graduation rates was observed among concentrators compared to non-concentrators. Changing inputs to the equations will offer opportunities to increase the return on investment and determine which programs may lead to sustained employment in high-wage and high demand jobs. In practice, the inputs to the equations would be implemented through performance-based funding and other policy actions. The analysis was applied to the cohort of current CTE programs and existing secondary and postsecondary CTE programs and is contained in the attached tables.

Approach

Determining a return on investment requires having two pieces of information: investments and outcomes.

The investment portion of the analysis focused on approximately $100 million annually in state Career and Technical Education (CTE) funds and approximately $14.3 million in Federal Perkins funding (for secondary education only) annually. For analysis of the cohorts, the exact level of funding was determined to associate with each cohort of students based on CTE enrollments and the funding formula in place each previous year. Through an electronic survey each of the school corporations statewide was asked to provide data on their local investment in CTE programs. The survey did not yield consistent data of significant value, so it was decided not to utilize this data. Also, the analysis did not look at the actual cost of providing the CTE programs locally; the analysis focused only on the State and

Federal dollars invested in the CTE programs. The actual costs locally will vary greatly based on the courses offered and local decisions regarding investments.

The analysis of CTE outcomes started by collecting student data from the Department of Education (DOE), the Department of Workforce Development (DWD), and the Commission for Higher Education (CHE). Students were organized into six cohorts and concentrators were identified. For the purposes of the analysis a "concentrator" was defined as either four or six credits taken across a pathway, depending on year enrolled, during high school. As this a new definition of a concentrator we do not have sufficient data to determine if increasing the credit requirement will increase the ROI of concentrators vs non-concentrators. The analysis focused on examining outcomes including: graduation rates, post-secondary enrollments and completions, wages and assessments for all groups that were identified as part of a cohort. Investments in concentrating students versus non-concentrating students were compared.

In the private sector ROI measures an organizations' past, present, and potential future performance. Using this concept, the project team adapted a simple ROI formula to use in this non-traditional study. In its simplest form, the formula is:

$$\text{Return on Investment } (\%) = \frac{Value\ of\ Program\ Outcomes}{Program\ Investment}\ x\ 100$$

Forecasting is accomplished by changing the numerator variables or the denominator, which provides information on potential impact of program or funding changes. To determine the equation's denominator and numerator the project team reviewed three years of historical data, more than 40,000 records. State and Federal funding by year, and by total credits funded per year, was used to find the total investment in each cohort.

Analysis

A key focus of the analysis was determining which outcomes were valued as a return on the investment dollars. Conceptually, each dollar invested in CTE programs should provide at least an equal amount of benefit; however this benefit may not be in the form of a traditional return. For example, earning a high school diploma is an outcome that provides students a better chance of finding gainful employment versus students that do not complete high school. Similarly, earning an industry recognized credential provides students the potential of earning higher wages than students who only earned a high school diploma. In theory, students who earn a high school diploma and an industry credential will be less likely to be unemployed and taking advantage of public benefits. There are also intangible returns to CTE education, where a student may use the experience to explore a career but ultimately determine that they do not wish or are not suited to pursue it. Making these decisions prior to post-secondary investment can be beneficial. If a student has narrowed down their desired post-secondary pursuits, they are more likely to complete a credential more quickly and to apply it to related employment. This will result in lower student loans and tuition costs and quicker gainful employment, and lower corresponding subsidies by the government to achieve the education.

The outcomes that the analysis focused on included: high school diploma and high school graduation rates, CTE concentrators, enrollment and completions in post-secondary education, and wages of students after graduation. The earliest cohort studied was the 2008 graduating class, which means that the wage data is at most six years out of high school, or about two years after a bachelor's degree. Recognizing that this skews the data, we only looked at those reporting full time employment and compares all those who aren't pursuing full time education to one another. When the data becomes available we recommend conducting a longer term wage analysis.

Summary of Findings

CTE Participants as a whole have better Graduation Rates, Post-secondary Enrollments and Completions, and Wages compared to non-participants with most of these differences in performance accounted for by difference between concentrators and non-concentrators. This means that CTE concentrators have a higher graduation rate compared to other students in their cohort and earn higher wages compared to other students in their cohort. Detailed charts and graphs describing these findings are contained in the presentation materials, see Attachment A.

Outcomes

Through understanding the relationship between the investment in CTE programs and the relationships to desired outcomes, policy makers can make adjustments to the CTE funding formula in an effort to generate a greater number of the desired outcomes. A couple of the key outcomes of the ROI study included:

1) Funding Formula Model
2) Career Pathway ROI

<u>Funding Formula Model</u>

EDSI developed an ROI formula to determine the return on investment, and applied the formula to the current CTE programs. Based on the results of the ROI formula, EDSI made forecasts and recommendations to address existing skills gaps in Indiana by developing a future funding model. The future funding formulas can be used by policy makers to determine how to incentivize outcomes like: concentrations, pathways, and industry credentials. The model allows for different percentages and payments for various outcomes and enrollments. The model allows policy makers to model and predict how changes in funding will affect outcomes and the impact that changes in funding will have on each school corporation. The model is designed to encourage more concentration by CTE participants, higher use of career pathways, and the earning of industry recognized credentials, and for more courses with a career focus to be offered rather than single introduction courses.

Considerations that were made in the development of the model included: incentivizing number of certifications earned, job placement and employment in related fields, post-secondary education completions in related fields. The model factored in providing a modest amount of funding for enrollments, and encouraged dis-incentivizing remediation.

Moving from an entirely enrollment based model to a mixed funding model where pathway completion, passing assessments and placement in related work or education will incentivize enrollments and course offerings in areas that offer higher return on investment, and bring a larger portion of investment into these area. While it will likely result in significant redistribution of funds among school corporations, over time each corporation should be able to shape their CTE programs to align with the new funding formula. EDSI completed an analysis modeling what funding would have been given at each school corporation using the 2012-13 course enrollments if the proposed future funding model had been in place. The model settled on kept 25% of funding associated strictly with enrollment, 70% based on completions of pathways and assessments, and 5% based on placements. While the new formula would result in significant reductions in some school corporations and significant increases in others, having a full academic year before the new formula is implemented will give corporations an opportunity to change their enrollment policies, courses offered, and to know what to expect in funding going forward.

Career Pathway ROI

Realizing that some career pathways provided a higher return than others, EDSI analyzed eleven selected diverse pathways, showing wage and post-secondary enrollment and completion for those completing pathways comparing regular concentrators, non-concentrators, and non-CTE participants. The analysis also included those who took one course versus those who took more than one CTE course, and if concentration was achieved through one course or a series of courses.

For each of the selected pathways, the full time wages earned for pathway completers were compared to those who took courses in the pathway without completing the pathway, and in turn against those who took CTE courses generally or did not participate in CTE at all. The analysis also included identifying how often employment was gained in a NAICs code that might be associated back to the CTE Career Pathway taken. The analysis identified a generally positive correlation with wages and pathway completion, but the differences were significant between the pathways.

Recommendations

The current CTE funding model is focused entirely on inputs. Students enroll in specific classes, which determine the amount of funding that a school corporation receives. The demand for courses is largely driven by what courses students are interested in taking and not driven by job opportunities or the needs of business. Shifting from paying for inputs to paying for outcomes will benefit both students that participate in CTE, and businesses looking for skilled workers.

The analysis has shown that students who concentrate are more likely to earn a high school diploma and an industry recognized credential. Incentivizing concentrators and career pathway completions will increase the number of high school diplomas and industry credentials earned. Incentivizing career pathways specifically in “in-demand” jobs will increase employment opportunities for high school graduates. School corporations could be incentivized to offer a full sequence of courses in a pathway or concentration to receive any CTE funding for an individual course shifting the responsibility to the school corporations to determine how to get more enrollments and concentrators in the right areas.

Developing an improved and dynamic list of industry certifications and credentials through the Works Councils and State Board of Education (SBOE) will give the school corporations a guide to which career paths and industry credentials are valued by the state. We recommend the list be reviewed every three years to allow the school corporations time to implement the programs and measure the outcomes. Also key is ensuring that employers are included in the discussion to determine “in-demand” jobs, and more importantly which credentials the employer’s value and the course curriculum that will meet employer needs.